Syllabus
Statistical Methods for Political Research
PLSC 502
Fall 2019
W 9:05-12:05, 236 Pond Lab

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Course Description: This course introduces you to quantitative tools of data analysis used in political science research. The goals of the class are as follows: First, you will start acquiring the tools necessary to understand and evaluate empirical research. Second, you will learn how to collect, analyze, and interpret data as well as how to present your conclusions. Finally, you will be equipped with the core concepts and theoretical foundations of quantitative analysis that will prepare you for more advanced classes.

Books/Readings: The required book for this course is:

DeGroot, Morris H., and Mark J. Schervish. *Probability and statistics.* Pearson Education, 2012.

The last few weeks include primary readings from other books. PDF copies of the relevant chapters will be provided on Canvas. The articles assigned as applications can all be found in the Penn State Library's electronic journal collection.

Software: The software for the course is the free and open source `R` statistical programming software. It is required that all problem sets and analyses reported in the research paper be completed using `R` .

Online Quizzes: There will be two short (four-question) online quizzes (on Canvas) each week, due by 5pm on Tuesday. The first quiz will test the material covered in the previous class session. This quiz is intended to evaluate each student's short-term mastery of the material. The other quiz will test the material to be covered in the next class session. This quiz is intended to evaluate each student's independent preparation (e.g., reading, practice, troubleshooting). Quizzes will be graded with a starting grade of 100, and 15 points deducted for each incorrect answer. The student's quiz grade for the week is the highest grade among the two quizzes. In completing the quizzes, students may consult the assigned readings and lectures from the course, and use R/RStudio, but may not discuss the quizzes with other students or use other written or electronic materials. Note, R can be used for computer algebra (e.g., taking analytical derivatives and integrals) via the `Ryacas` package (see `https://www.r-bloggers.com/using-r-as-a-computer-algebra-system-with-ryacas/`).

Software workshops: During most class sessions we will conduct analysis of real or simulated data in order to explore real-world data and/or illustrate the properties of methods covered in the course. Students will upload their R scripts to Canvas at the end of the course session.

Application presentations: Each week we will briefly discuss one application paper that makes core use of the concepts covered in the respective week. Each student must give two ten-minute presentations in which they summarize the article and describe the role played by the methods covered in the course in the respective application. Students must sign up for both of their presentations via SignUpGenius by 8/31.

Research paper: Students are required to write an original research paper. The final draft is due on 12/18.

- **Topic**: The paper can address virtually any topic in which students are interested. There are two constraints. First, the data to be analyzed must be both generated (e.g., an election occurs, a survey is run, a roll call vote is taken) and collected between 11/6 and 12/11. Second, the analysis plan must include running at least one statistical test for association, which can include a t-test, χ^2 test, a test based on bootstrapped confidence intervals, a permutation test, and/or a hypothesis test applied to one or more regression coefficients. The topic of the research project, including a description

of the data to be generated and collected, and the association for which the student intends to test, should be written up in a 1–2 page document. This will be due on 10/2.

- **Pre-registration report**: A pre-registration report is a detailed research design prepared with enough detail that the reader knows exactly what the authors will do, and why. Students should submit a first draft that includes an introduction, theory, research design, and plan for analyzing the data collected. The paper may, but does not need to, include analysis of existing data as support for what you think you will find once the data is collected (i.e., pilot data). This will be due on 10/30. Feedback on the first drafts will be provided within one week of submission. By 11/6, students should post their revised preregistration reports to their Penn State Box accounts, and send the instructor a link at which the final report can be accessed.

- **Presentation**: Students will present their projects during the final course session of the semester, on 12/11. The presentation will be 15 minutes in length.

Grading:

- Online quizzes: 50%.
- Research paper: 30%.
- Application presentations: 10%.
- Software workshops: 10%.

Grading Scale.

Grade	Lower	Upper
A	92	101
A-	90	92
B+	88	90
B	82	88
B-	80	82
C+	78	80
C	72	78
C-	70	72
D+	68	70
D	62	68
D-	60	62
F	0	60

Course Schedule: The schedule below gives the required reading. The readings listed for a particular date should be read before class time that day. Full citations can be found below in the references section.

Course Introduction

1. 8/26, Course Intro: Syllabus, R/R-Studio, GitHub, Box, and Overleaf
    - Figueiredo Filho, Lins, Domingos, Janz and Silva (2019)
    - **Optional**: For a crash course in R, skim and try out Chapters 1–4 of Pearson (2018) (available free through PSU library). Can be completed any time.
2. 9/4, Introduction to Probability Theory
    - **Methods:** Ch 1 of DeGroot and Schervish (2012).
    - **Application:** Williams and Doessel (2016)
3. 9/11, Conditional probability
    - **Methods:** Ch 2 of DeGroot and Schervish (2012).
    - **Application:** Hammond and Fraser (1983)
4. 9/18, Random variables and distributions
    - **Methods:** Ch 3 of DeGroot and Schervish (2012).

- **Application:** Cooper (2001)

5. 9/25, Expectation
    - **Methods:** Chapter 4 of DeGroot and Schervish (2012).
    - **Application:** Furniss (1973)
6. 10/2, Important distributional families
    - **Methods:** Chapter 5 of DeGroot and Schervish (2012).
    - **Application:** Kahana and Klunover (2015)
7. 10/9, The LLN and CLT
    - **Methods:** Chapter 6 of DeGroot and Schervish (2012).
    - **Application:** Jones, Sulkin and Larsen (2003)
8. 10/16, Estimation methods
    - **Methods:** Chapter 7 of DeGroot and Schervish (2012).
    - **Application:** Kernell (2009)
9. 10/23, Sampling Distributions
    - **Methods:** Chapter 8 of DeGroot and Schervish (2012).
    - **Application:** Koppell and Steen (2004)
10. 10/30, Hypothesis testing with normal distributions
    - **Methods:** Chapter 9 of DeGroot and Schervish (2012)
    - **Application:** Martin (2002)
11. 11/6, Hypothesis testing beyond normal distributions
    - **Methods:** Chapter 10 of DeGroot and Schervish (2012)
    - **Application:** Berinsky and Chatfield (2015)
12. 11/13, Introduction to regression
    - **Methods:** Chapter 3 of Gelman and Hill (2014)

- **Application:** Wallsten, Nteta, McCarthy and Tarsi (2017)

13. 11/20, Advanced considerations in regression
    - **Methods:** Chapter 4 of Gelman and Hill (2014)
    - **Application:** Bates and Santerre (2006)
14. 12/4, The Bootstrap and Permutation testing
    - **Methods:** Chapter 14 of Moore and McCabe (2005)
    - **Application:** Chatagnier (2012)
15. 12/11, Project presentations

Disability Accommodation Statement Penn State welcomes students with disabilities into the University?s educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus (http://equity.psu.edu/sdr/disability-coordinator). For further information, please visit Student Disability Resources website (http://equity.psu.edu/sdr/).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines (http://equity.psu.edu/sdr/guidelines). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Academic Integrity Statement Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students? dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts

of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Counseling and Psychological Services Statement Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients? cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services at University Park (CAPS)
(http://studentaffairs.psu.edu/counseling/): 814-863-0395

Counseling and Psychological Services at Commonwealth Campuses
(http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/)

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400 Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity/Report Bias Statements Consistent with University Policy AD29, students who believe they have experienced or observed a hate crime, an act of intolerance, discrimination, or harassment that occurs at Penn State are urged to report these incidents as outlined on the University?s Report Bias webpage (http://equity.psu.edu/reportbias/)

References

Bates, Laurie J and Rexford E Santerre. 2006. "Leviathan in the Crosshairs." *Public Choice* 127(1-2):133–145.

Berinsky, Adam J and Sara Chatfield. 2015. "An Empirical Justification for the Use of Draft Lottery Numbers as a Random Treatment in Political Science Research." *Political Analysis* 23(3):449–454.

Chatagnier, J Tyson. 2012. "The effect of trust in government on rallies round the flag." *Journal of Peace Research* 49(5):631–645.

Cooper, Alexandra L. 2001. "Nonminating Presidential Candidates: The Primary Season Compared to Two Alternatives." *Political Research Quarterly* 54(4):771–793.

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Figueiredo Filho, Dalson, Rodrigo Lins, Amanda Domingos, Nicole Janz and Lucas Silva. 2019. "Seven Reasons Why: A Users Guide to Transparency and Reproducibility." *Brazilian Political Science Review* 13(2).

Furniss, Susan W. 1973. "The Response of the Colorado General Assembly To Proposals for Metropolitan Reform." *Western Political Quarterly* 26(4):747–765.

Gelman, Andrew and Jennifer Hill. 2014. *Data analysis using regression and multilevelhierarchical models*. Vol. 1 Cambridge University Press New York, NY, USA.

Hammond, Thomas H and Jane M Fraser. 1983. "Baselines for evaluating explanations of coalition behavior in Congress." *The Journal of Politics* 45(3):635–656.

Jones, Bryan D, Tracy Sulkin and Heather A Larsen. 2003. "Policy punctuations in American political institutions." *American Political Science Review* 97(1):151–169.

Kahana, Nava and Doron Klunover. 2015. "A note on Poisson contests." *Public Choice* 165(1-2):97–102.

Kernell, Georgia. 2009. "Giving order to districts: Estimating voter distributions with national election returns." *Political Analysis* 17(3):215–235.

Koppell, Jonathan GS and Jennifer A Steen. 2004. "The effects of ballot position on election outcomes." *The Journal of Politics* 66(1):267–281.

Martin, Elizabeth. 2002. "The effects of questionnaire design on reporting of detailed Hispanic origin in Census 2000 mail questionnaires." *The Public Opinion Quarterly* 66(4):582–593.

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URL: *https://books.google.com/books?id=ntp_S_kbNu0C*

Pearson, R.K. 2018. *Exploratory Data Analysis Using R*. Chapman & Hall/CRC Data Mining and Knowledge Discovery Series CRC Press.
URL: *https://books.google.com/books?id=-UlaDwAAQBAJ*

Wallsten, Kevin, Tatishe M Nteta, Lauren A McCarthy and Melinda R Tarsi. 2017. "Prejudice or principled conservatism? Racial resentment and white opinion toward paying college athletes." *Political Research Quarterly* 70(1):209–222.

Williams, Ruth FG and DP Doessel. 2016. "Reallocating Australias Scarce Mental Health Resources." *Agenda: A Journal of Policy Analysis and Reform* 23(1):47–69.